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RELATION BETWEEN THE WAY GENERAL AND SPECIFIC PRINCIPLES ARE LEARNED AND HOW THEY ARE USED.

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DESCRIPTORS- #LEARNING, COLLEGE STUDENTS, #TRANSFER OF TRAINING, CODIFICATION, LEARNING PROCESSES,

THE PURPOSE OF THIS PROJECT WAS TO FIND (1) A LEARNING SITUATION IN WHICH THERE IS NO INTIMATION OF A FUTURE TRANSFER TEST AND YET (2) DEMONSTRATE TRANSFER FROM THE LEARNING BY A STABLE DIFFERENCE IN THE PERFORMANCE OF CONTROLS IN THE SECOND TEST. THE TECHNIQUE OF CRYPTOGRAPHY PERMITTED TESTING OF THE HYPOTHESIS. THE SUBJECTS WERE COLLEGE STUDENTS. THE INDEPENDENT VARIABLE WAS THE DIFFERING AMOUNTS OF GUIDANCE BEYOND CODED EXAMPLE FOR AN INITIAL EXPERIENCE, WITH EACH OF 10 PROBLEM SENTENCES. THE DEPENDENT VARIABLE WAS PERFORMANCE ON THE SAME 10 CODES AS IN THE ORIGINAL EXPERIENCE, AND 20 OTHERS FROM TWO OTHER FAMILIES OF CODES. FOR A POWER CODING TEST WITH REDUNDANT PROBLEMS WITHIN THREE FAMILIES OF CODES, THE CONCLUSION WAS THAT THE "GIVEN-DERIVED" VARIABLE IS AS SECONDARY A PRINCIPLE AS FREQUENCY IS IN THE GENERAL STUDY OF LEARNING. TRANSFER IS POSSIBLE WITH EITHER A DERIVING OR GIVEN EXPERIENCE. RECOMMENDATIONS FROM THIS EXPERIMENT ARE GIVEN. (PH)

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Relation between the Way General and Specific Principles Are Learned and How They Are Used

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Summary

The question of how to get adequate transfer--whether to guide the learner or let him work out the solution himself--is still awaiting an unequivocal answer. Required is an isolation of the guidance variable from the transfer variable to allow systematic study.

Our project is built around finding a learning situation in which there is no intimation of a future transfer test and yet transfer from the learning can be demonstrated by a stable difference in the performance of controls in the second test. The technique of cryptography permits testing of the hypothesis concerning the controls and, secondly, whether on a new coding test the experimental groups who had derived coding principles only from examples will be differentiated from experimental groups that had the examples but also were given the coding principles.

The main differences from previous studies are: the exclusive examination of availability through power rather than speed, a learning task of specifics that yet is generalizable, several families of supraordinate codes, a transfer test of the entirely new as well as variants of the initial learning, numbers sufficient to examine the degrees of the guidance variable, and concealment of need for future transfer.

The Ss were over 1100 college students in pilot and final experiments. The independent variable was the differing amounts of guidance beyond a coded example for an initial experience with each of ten problem sentences, each coded differently but in the same family of codes. The dependent variable was performance on the same ten codes as in the original experience and the twenty others from the other two families of codes, all randomly distributed among thirty multiple-choice encoding problems. Controls had only the second or transfer test and no earlier exposure to coding. The initial and transfer tests were either immediately tandem, separated by a week or six weeks. Groups were given either a deriving or guided experience initially, but an interaction group had five derived and five given problems in the first test. Exposure to equated experience was tested by yoking each S given guidance to a particular deriving S and his successfully coded problems.

The thirty mc transfer test is an instrument that permits reliably the separation of the effect of learning in the experimental Ss from the lack of such effect in the controls. While an occasional small group would show a significant difference favoring the deriving group, further study of other similar groups indicated that no general statement of a strong effect from the deriving experience could be substantiated.

For a power coding test with redundant problems within three families of codes and with the other conditions of this experiment, the conclusion seems inescapable that the "given-derived" variable is as secondary a principle as frequency has turned out to be in the general study of learning. A reexamination of the earlier articles on guidance in learning corroborates that transfer is possible with either a deriving or given experience. One of the most important factors favoring transfer,

projection-anticipation, ought to be studied now in relation to the demonstrated secondary "given derived" variable. The "gain score" may also provide a clue.

Introduction

In a dynamic, changing society transfer becomes increasingly important but less probable with the scarcity of identities between original and subsequent experience emphasized by one line of thought. Others, following Judd, have seen transfer as the essential problem of education and have contended they can get it by emphasizing the learning of principles.

The experimental studies, however, indicate no automatic, inevitable association of principles and transfer. Discovery would seem a priori a promising condition for availability on later problem. Bruner had made a persuasive case for this in his The Process of Education. While several studies have offered support, on closer examination it seems to be only in part and with very special conditions. Gagné and Brown (1961) found Guided Discovery (with small steps) better than Discovery (with large steps) though both were better for transfer than giving the rule. Kersh (1962) found that for recall and transfer Rote Learning and Guided Discovery were about equally effective. In Wittrock's very extensive experiment (1963), the situation most resembling Discovery (rule not given, answer not given) was poorest of all four groups ostensibly, but this group was the only one that showed a "gain score" on the recall and transfer testing. One should note, however, that Wittrock's presentation of coding problems was so atomistic that probably no S could make extensive generalizations on how to code new problems.

On a modified Gagné-Brown type of study using the learning of certain mathematical principles of series, Della-Piana (1965) found with ninth graders that while the total problems had a directional favoring of discovery, a significant difference appeared for only one of the four problems and this only on a delayed four-week transfer test. Worthen (1965) on similar mathematical problems concluded that exposition was superior to discovery and at least as favorable in developing good attitudes toward numbers.

Some have found evidence to support discovery under special conditions. Guthrie (1967), examining expository instruction versus a discovery method, found his Example group (discovery) significantly (.05) superior to all other groups on remote transfer (to codes not part of the original instruction) and the Rule-Example as significantly inferior on transfer as it was superior to the other groups on retention. Guthrie had his Ss learn individually to a criterion of eight correct responses before testing immediately on thirty cryptograms.

Haslerud and Myers (1958) used the "gain score" to examine the differential outcome of what was given and what was derived in the same S. Derived codes showed a later gain while given codes a loss. This finding was also corroborated with an item analysis of the outcome for particular

codes (Haslerud, 1965). While our study was regarded by some as favorable evidence for transfer by deriving, others like Ausuble (1961) criticised its methodology. It does assume a compartmentalization of given and derived learning and certainly has needed a recheck with independent groups and a tightened methodology. That was the inception of the present study.

The present research tests in the null form two hypotheses: (1) The experimental groups with prior coding experience will be undifferentiated on a new test of coding from the control groups without such prior experience (2) On a new coding test the experimental groups that had derived coding principles only from examples will be undifferentiated from experimental groups that had the examples but also were given the coding principles.

Methods

The basic instruments of this research were made from 90 sentences, 18 letters long, all words in the first 5000 of the Thorndike-Lorge list, and with no infrequent letters like q and z.

Three supraordinate coding principles were found with at least 10 subordinate principles. See Appendix A for their statement and variety. One will note in Appendix B that a commonly used supraordinate family of codes, rearrangement, had to be given up because our college Ss got nearly all items correct immediately. Appendix A also illustrates the relation of the example and its coding to the problem and its spaces for the encoding in the initial test and the sentence with its four alternative encodings in the transfer second test. Note that the alternatives are true, partially true, a randomization of the letters in the alphabet, and a randomization of the letters in the sentence.

Table 1 portrays how the examples, supraordinate, and subordinate principles were arranged. While in the independent groups each S got the codes in the cell to which he was assigned, all Ss got the same 30 mc transfer test.

Table 1
Schema for the Independent Experimental Groups

		Test 1			Interval**	Transfer Test 2 $T_1T_2T_3$
	Derive from Example	General Principle & Example	Specific Principle & Example	General & Specific Principle & Example		30 mc encodings with no Example
General Code I	a_1 *	b_1	c_1	d_1		T_1
General Code II	a_2	b_2	c_2	d_2		T_2
General Code III	a_3	b_3	c_3	d_3		T_3

* Ss in this cell met the same 10 subordinate codes of General Code I as those in b_1.....T_1 ** Immediately, one week or six weeks

Even though in a power test the slower deriving Ss would get to each of their ten problems, it seemed desirable to set up a stricter sort of functional exposure to the specific codes by the deriving and given groups. This was done by yoking a particular S in the deriving group with an S in each of the three given groups. The former's performance (eliminating those Ss who had a zero or a perfect 10 score) set the problems of his yoked Givens. For example, if he had succeeded only on problems 3 and 6, all the other problems were blacked out or cut out for the three Ss in the three Given groups who happened to be yoked to him.

Interaction of codes was studied in a complex design based on each S getting 5 D and 5 G problems during the initial learning. With three supraordinate codes, six combinations of D and the three levels of G, the two orders of D first or last, and the two sexes the relative potencies of the deriving and given situations ought to be manifest.

Most of the first year of the project was given to pilot experiments testing various codes and arrangements. These were given to class groups during class time. Since the evaluation required that the S be present two successive weeks on the same day, some wastage of Ss occurred. Most Ss cooperated well though the purpose of the experiment had to be concealed until later when E talked to each class. There was no mention made the first time that a transfer test would be given the following week.

The Ss for the final experiments were secured from the student experimental pool, contacted through the classes or by phone to meet in the small testing groups, and represented a random sample for each condition except that an attempt was made to equalize the sexes. On the last two experiments the selection was made by computer. Where groups needed equalization, an extra S was dropped by random number table and a needed case was added by giving it the mean value of the variable.

In the pilot experiments Ss took the tests as part of their psychology course. In the final experiments the initial test was just one of the hours required of each S for the experimental pool, but at the beginning of his appointment at the transfer test he was told that he would be paid at the end of that test.

The Test 1 score required hand correction. If 3 or more of the 18 letters coded were wrong, no credit was given for that problem. Transfer Test 2 was at first corrected for the three subgroups of 10 codes from each of the 3 supraordinate families of codes by stencil but then visual scanning on a special test by Digatek was substituted. In the latter experiments the correcting was done by a special computer program along with other statistical compilation. Some hand correction was done as a check on the Digatek and computer.

Time in all the experiments was measured in two-minute blocks to be copied from the board when finishing the test.

Because of the independent groups there was no doubt about the feasibility of using the analysis of variance on the total transfer score of number right among the 30 mc. Because in addition our interest was in the three sub-scores, to examine the differing effect on the "same" codes as in the original learning and the "other" codes not previously met, some of the calculations required the special method of analysis of variance for repeated measures.

Results and Analysis

The results from approximately 800 Ss will be presented in a number of tables. Instead of routinely giving all anovas which had been calculated, certain other expository devices are employed where they seem clearer and more economical.

Table 2 indicates that even repetition of the 30 mc transfer does not result in a significant change in score except for one group repeating it after 6 weeks. However, even this large increase in score did not make it equal to that of the experimental groups as can be seen in Table 8. In numerous groups where the controls are compared with the experimentals, there is a uniform difference at the .05 or better level. The only exception is the group in Table 2 in which the second testing makes the higher score of the Given group non-significant though that for the Derived group still meets the .05 level of significance.

Table 2
Comparison of Three Control Group Repetitions of T Test

	first time		interval	second time*	
n	X	S.D.		X	S.D.
17	10.30	9.39	immediate	10.88	10.11
17	11.47	8.92	1 week	13.17	11.15
17	12.88	9.02	6 weeks	17.82**	9.84

* Ss were told at the beginning of the second time they would be paid.
** The mean of 17.82 does not reach the .05 level of difference from the group's first testing.

Table 3
Distribution of Ss in the Independent Groups

Interval between Tests 1 and 2	General Code	Deriving Group	Given General	Given Specif.	Given General & Specif.	Total
Immediate	I	10		10	10	30
	II	10		10	10	30
	III	10		10	10	30
One Week						
One week	I	12	12	12	12	48
	II	12	12	12	12	48
	III	18	18	18	18	72
Six weeks	I	14	11	12	11	48
	II	14	11	12	11	48
	III	14	11	12	11	48

Analyses of variance were done for each of the time intervals. For the tandem and six weeks groups there was no significance in the difference between deriving and given groups. At one week, however, while there was no difference significant on the "same" codes (as in initial learning), there was a .05 difference on the "other" or transfer codes. But this is no comfort for those espousing deriving as the best method, because the Duncan test indicates it arises out of the inferior performance of the group given the most help--Given General Principle & also Specific Codes. The deriving group, the Given General, and the Given Specific were not differentiable from one another but were all differentiable from the fourth group.

That one must reject the null hypotheses for Ss indicates the wide variability in all groups.

Table 4
Relation between Success on the 30 mc T Test Codes that Are the Same as Those in Test 1 and Those that Are Different

	n	Deriv.	Give General	Give Specif.	Give General & Specific
Same 10 codes	29	200	205	224	206
Diff. 20 codes	29	410	373	385	305*

* Signif. at $p < .05$ different from the other three groups in the row, which are not differentiated from each other. There is no discriminable difference on the "same" codes.

Table 5

Analysis of Variance for Repeated Measurements of the Three Sub-Scores of the T Test for 18 Ss in Each of the Four Levels (L) of Guidance from Deriving to Giving General and Specific Principles. G = the Three General Codes Represented by Ten Subordinate Codes Each in the T Test.

Source	df	SS	MS	F
Between				
Level (L)	3	37.13	12.38	--
$Error_{(b)}$	68	1037.31	15.26	
Within				
General (G)	2	98.23	49.12	4.65*
L x G	6	11.14	1.86	--
$Error_{(w)}$	136	1437.63	10.57	

* $p < .05$

Table 5 indicates that the general codes differ from each other in difficulty, but for all three there is no differentiation between the deriving group of 18 Ss and the other three groups given various amount of help.

Table 6

Analysis of Variance of Repeated Measurements on the Three Sub-Scores of the T Test for General Code III of 16 Ss in a Deriving Group and 16 in Each of the Other Three Levels (L) of Degrees of Guidance Yoked to the Deriving Ss. G = the Three General Codes.

Source	df	SS	MS	F
Between				
Level (L)	3	25.71	8.57	--
$Error_{(b)}$	60	1280.21	21.34	
Within				
General (G)	2	83.45	41.72	3.19*
L x G	6	8.01		--
$Error_{(w)}$	120	1566.75	13.06	

* $p < .05$ General codes differ in difficulty, but the Levels of Guidance are undifferentiable.

Table 6 is for General Code III (vowels and consonants) but it might be duplicated for similar results by four groups of Levels using General Code I (shifting) with 12 Ss in each of the groups. The same was true for Code II (substitution), also with 48 Ss.

Table 7

Four-way analysis of variance of interaction for 120 Ss each of whom had at first test 5 codes to derive and 5 to solve with given principles.

Source	df	SS	MS	F
General (G)	5	81.61	16.30	2.12
Type* (T)	4	12.2	3.1	--
Order (O)***	1	9.4	9.4	1.22
Sex. (S)	1	11.3	11.3	1.47
G x T	20	145.5	7.28	--
G x O	5	154.0	30.8	4.01**
G x S	5	148.3	29.7	3.87**
T x O	4	12.8	3.2	--
T x S	4	34.2	8.6	1.11
O x S	1	24.2	24.2	3.15
Error	351	2200,4	7.68	

* Type: Derive - Given-Given - Given - unseen 3 scores in
Gen. Speed. G&Speed. code 5 possible
** Significant at .01 level places.
*** Order: Whether D or G given first

Table 8

Choice of Four Alternatives of Each of 30 mc* in Transfer Test for Various Groups.

	Transfer (correct)	Partial Transfer	Randomization letters in sentence	Random alphabet
Control (20)	12.05	2.50	8.00	6.95
Deriving (18)	21.89	2.55	2.55	1.72
Given-Specific (18)	20.88	3.16	2.61	2.22

* Some additions do not equal 30 because of unanswered questions.

Table 9

Examination of the "Gain Score" in Terms of the Relation of Success or Failure on the Same Code in Transfer Test 2

Group	n	Both Correct	(loss) Correct I Incorr. 2	(gain) Incorr. I Correct 2	Both Incorr.
Derive	29	91	24 (8%)	105 (36%)	70
Given Gen. & Specif. Principles	29	191	79 (27%)	13 (4%)	7

Table 8 shows the difference between the two kinds of experimental groups and the controls in the kinds of choices made on the four-choice mc T Test. It might be possible to use this as one of the ways to discriminating a transfer response from another kind.

Table 9 shows that "gain scores" discriminate between the deriving and given groups, at least for group differences. One finds this in group after group.

Conclusions and Recommendations

One must reject the null hypothesis and conclude there are real differences between our control and experimental groups on the 30 mc T Test. This indicates there is something transferred to be analyzed.

The null hypothesis must, however, be accepted for the differences between the deriving and given groups. For an impressive variety of

experiments--independent groups, yoked groups, and an interaction experiment--there seemed to be no consistent difference between the deriving and given groups. The slight tendency to favor deriving as a way of getting transfer shows up sporadically on general measures but quite consistently on "gain scores" as in Table 9. On a wide testing of many groups this author reluctantly concedes that the "derive-given" variable is too slight a reed to lean on for any considerable transfer.

That both the deriving and given groups are consistently above the control group on the transfer test but still not different from one another indicates that both are roads to transfer. However, what is common to them may be a much more fundamental factor favorable to transfer, projection-anticipation perhaps.

From this experiment come three recommendations:

1. Do not depend on automatic transfer from D or G but find a way to get Ss to project to future use.

2. Do not be doctrinaire about a single D or G approach; experiment may indicate a mix is preferable.

3. Use the "derive-given" variable to evaluate the significance of projection-anticipation.

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Appendix A

First tests with common instruction sheet

EA_{34} becomes EA_3 by removing the general code statement leaving it with 10 specific principles
EA , the deriving form is made by deleting the specific and general principles from EA_{34}
EA_2 is made by adding the general code statement to EA.

EB_{34}

EX_{34}

Second test, the Transfer T Test has an instruction sheet and three pages of 30 mc problems in coding.

Letter(s) on board at finish.....

Please do not turn the page until the instructions and signal are given.

NAME(print).....Sex.....Date.....
(last) (first) (initial)

Class & College.....Subject & Section.....

****** ****** ******. ******

Read the following instructions carefully.

This is a series of problems in translating from English sentences to various codes. The directions are given before each solved example. Now apply the directions to the problem sentence by printing in each of the spaces below it the proper letter. Your filling in of the letters in line 4 should bear the same relation to the sentence in line 3 as line 2 does to line 1.

Double the first letter of each word.

Example: SAY THAT ONCE MORE (1)

S S A Y T T H A T O O N C E M M O R E (2)

Problem: GIVE TWO CENTS (3)

G G I V E T T _ _ _ _ _ _ _ _ _ (4)

Now try another situation: Double the last letter of the first word, the first letter of the second word, etc.

Example: GO HOME WITH THAT

G O O H H O M E W I T H H T T H A T

FIND THE FACTS

- - - - - - - - - - - - - - - - -

You may find helpful the alphabet and vowels in order at the bottom of the problem page and also the statement at the top of the next page.

There is no set time for these problems except the end of the class, but try to finish all. When you have encoded all 10 sentences on the next page please turn back to this cover page and record at the top on the dotted space the letter(s) then appearing on the board.

Please print legibly a letter for each space. Turn the page to start the encoding when the signal is given,

Shift each letter systematically

1. Exchange the previous letter in the alphabet for each letter in the sentence e.g., a for b & c for d.

COUNT THE COST AND PAY

B N T M S S G D B N R S Z M C Q Z X

TWO GOATS ARE SIMILAR

---

2. Exchange the next letter in the alphabet for the first 9 letters in the sentence, e.g., b for a & d for c. Then exchange the previous letter in the alphabet for the last 9 letters in the sentence, e.g., a for b and c for d.

A CRASH CAUSED DOUBTS

B D S B T I D B V R D C C N T A S R

CONFUSION DISTRACTS

---

3. Exchange the second next letter in the alphabet for each of the first 9 letters in the sentence e.g., c for a and d for b. Then exchange the previous second letter in the alphabet for each of the last 9 letters in the sentence e.g., a for c and b for d.

A WAVE BREAKS ROUGHLY

C Y C X G D T G C I Q P M S E F J W

RETIRE WITH MUCH LUCK

---

4. Exchange the second previous letter in the alphabet for each letter in the sentence e.g., a for c.

CULTIVATE AN ORCHARD

A S J R G T Y R C Y L M P A F Y P B

LET THEM GO ONCE AGAIN

---

5. Exchange the third next letter in the alphabet for each letter in the sentence e.g., d for a.

BUY DAILY NEWSPAPERS

E X B G D L O B Q H Z V S D S H U V

FRIGHTEN AWAY A TIGER

---

6. Exchange the third previous letter in the alphabet for each of the first 9 letters in the sentence e.g., a for d and b for e. Then exchange the third next letter in the alphabet for each of the last 9 letters in the sentence e.g., d for a and e for b.

NEVER DECEIVE ANYONE

K B S B O A B Z B L Y H D Q B R Q H

ADVANCE TOGETHER NOW

(Continue on next page)

Shift each letter systematically.

7. Exchange the second following letter in the alphabet for each letter in the sentence e.g., c for a.

WHEN ABLE AVOID GERMS

Y J G P C D N G C X Q K F I G T O U

HE WENT HOME ABRUPTLY

- - - - - - - - - - - - - - - - - - -

8. Exchange the previous second letter in the alphabet for each of the first 9 letters in the sentence e.g., a for c and b for d. Then exchange the second next letter in the alphabet for each of the last nine letters in the sentence e.g., c for a and d for b.

A SORE ARM OR LEG ACHES

Y Q M P C Y P K M T N G I C E J G U

RETREAT WITHOUT FEAR

- - - - - - - - - - - - - - - - - - -

9. Exchange the next letter in the alphabet for each letter in the sentence e.g., b for a and d for c

CONTINUE TO CONSIDER

D P O U J O V F U P D P O T J E F S

CRY FROM THE PLATFORM

- - - - - - - - - - - - - - - - - - -

10. Exchange the previous letter in the alphabet for the first 9 letters in the sentence e.g., a for b and c for d. Then exchange the next letter in the alphabet for the last 9 letters in the sentence e.g., b for a and d for c.

A BABY CREPT ON THE RUG

Z A Z A X B Q D O U P O U I F S V H

PLEASE SPEAK CLEARLY

- - - - - - - - - - - - - - - - - - -

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A E I O U

Now turn back to cover page and in the dotted space at the top put the letter(s) now appearing on the board.

Substitute systematically for certain letters

1. Substitute J, K, Q, for L, N, R respectively and substitute for each vowel the second previous vowel, e.g., a for i

SEASON OR FLAVOR SOUP

S U O S E K E Q F J O V E Q S E I P

REVEAL NOTHING TO HER

---

2. Substitute K, Q, Z for N, R, T respectively and substitute for each vowel the vowel just previous to it, e.g., a for e

THE SON SAW A STRANGER

Z H A S I K S U W U S Z Q U K G A Q

RETURN TO WORK AT ONCE

---

3. Substitute F, J, Z for D, L, T respectively and substitute for each vowel the vowel just following it, e.g., e for a

TIDE LEVEL OFTEN DIPS

Z O E I J I V I J U E Z I N E O P S

DOGS LAY NEAR THE LAKE

---

4. Substitute F, K, Q, for D, N, R respectively and substitute for each vowel the second following vowel, e.g., i for a

DECISIONS HAVE MERIT

F O C U S U A K S H I V O M O Q U T

A HUSBAND CARVES MEAT

---

5. Substitute F, J, K, for D, L, N respectively and substitute for each vowel the vowel just previous to it e.g., a for e

DIVIDE THEN MULTIPLY

F E V E F A T H A K M O J T E P J Y

LIFT DOWN THE CLOTHES

---

6. Substitute F, X, Z for D, S, T respectively and substitute for each vowel the second following vowel, e.g., i for a.

DECIDE WHEN TO REFUSE

F O C U F O W H O N Z A R O F E X O

SAIL AWAY TO AN ISLAND

(continue on next page)

Substitute systematically for certain letters

7. Substitute F, Q, Z, for D, R, T respectively and substitute for each vowel the third following vowel, e.g., O for a

DRY YOUR TEARS AT ONCE

F Q Y Y E I Q Z U O Q S O Z E N C U

DO WRITE BEFORE GOING

---

8. Substitute J, Q, X, for L, R, S respectively and substitute for each vowel the third previous vowel, e.g., a for O

MONEY WAS SPENT LATER

M A N O Y W I X X P O N T J I T O Q

SCHEDULE NO SEMINARS

---

9. Substitute J, K, X for L, N, S respectively and substitute for each vowel the vowel just following it. e.g., e for a

FUN ENABLES PLEASURE

F A K I K E B J I X P J I E S A R I

PLAY IN THE SAND TODAY

---

10. Substitute Q, X, Z for R, S, T respectively and substitute for each vowel the second previous vowel, e.g., a for i

WE RARELY ENJOY DIETS

W U Q O Q U L Y U N J E Y D A U Z X

SELDOM REGRET WEALTH

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A E I O U

Now turn back to <u>cover page</u> and in the dotted space at the top put the <u>letter(s)</u> now appearing on the board.

EX 34

Substitute according to the relationship
that vowels bear to consonants

1. For each consonant substitute the previous consonant in the alphabet. For each vowel substitute the next vowel in the alphabet.

PUT A RAG IN THE DRAWER

N A S E Q E F O M S G I C Q E V I Q

A WRITER HAS FEW HOPES

2. For each consonant substitute the next vowel in the sentence. For each vowel substitute the next consonant in the sentence.

EACH DREAM CONFLICTS

C C E E E E M M O O N I I I C C T S

POUR WATER IN A BUCKET

3. For each consonant substitute the previous vowel in the alphabet. For each vowel substitute the previous consonant in the alphabet.

THE DRIVERS GO SO FAST

O E D A O H U D O O E N O N E Z O O

SILVER MAY BE FOREIGN

4. For each vowel substitute the previous consonant in the sentence. Consonants remain unchanged.

DELEGATE PROPER JOBS

D D L L G G T T P R R P P R J J B S

BURN NO COAL FOR A FIRE

5. For each consonant substitute the next vowel in the alphabet. For each vowel substitute the next consonant in the alphabet.

DEMONSTRATE ABILITY

E F O P O U U U B U F B E J O J U A

THAT RULER REJECTS ME

6. For each consonant substitute the next consonant in the alphabet. For each vowel substitute the previous vowel in the alphabet.

CODE ANY MAIL SENT OUT

D I F A U P Z N U E M T A P V I O V

CEASE THESE THOUGHTS

A B C D E F G H I J K L M N O P Q R S T U V W Q Y Z A E I O U

Substitute according to the relationship that vowels bear to consonants

7. For each consonant substitute the next vowel in the sentence.
For each vowel substitute the previous consonant in the sentence.

TOIL WITHOUT DISPUTE

O T T I I W O O H H I I D U U P E T

IT NEVER CONCERNS YOU

---

8. For each consonant substitute the previous consonant in the alphabet.
For each vowel substitute the previous vowel in the alphabet.

DUCK AND DO NOT GET WET

C O B J U M C C I M I S F A S V A S

CHART A COURSE FOR HER

---

9. For each vowel substitute the next consonant in the sentence.
Consonants remain unchanged.

MEN CLUSTER IN GROUPS

M N N C L S S T R R N N G R P P P S

IT IS THE END OF WINTER

---

10. For each consonant substitute the previous vowel in the sentence.
For each vowel substitute the next consonant in the sentence.

DEMAND TO OPEN THE BAG

D M E N A A A P P O N E E E B E G A

CORN GROWS IN A GARDEN

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A E I O U

T

Letter(s) on board at finish.....

Please do not turn the page until the instructions and signal are given.

NAME(print).....Sex.....Date.....
(last) (first) (initial)

Class and College.....Subject and Section.....

***** ***** ***** ***** ***** ***** *****

Read the following instructions carefully.

You may remember how your clique in junior high used "Pig" Latin as a way of communicating. Instead of a plain "meet at the house" one wrote a mysterious note "Eetma tea heta ouseha." The code consisted in putting the first letter last and adding "a".

Now detect which one of the four alternatives in the following example is a consistent coding by some principle.

GO AHEAD OF US

(1.) GGOAAHEADOOFUUS ← NOTE consistent doubling of the first letter of each word.
2. FOXAAHEADDFOUUS ← NOTE that here the coding is only partial.
3. NXBMNZLBFCLNLTD ↖ Random
4. ZLBCMOJQTAUBTGN ↙

On the following pages are 30 problems, each one with a different principle. Circle the number of the alternative that makes the correct coding, as in the example above.

Do not spend too much time on any one item. Work carefully but rapidly. You will find the alphabet and the vowels in order at the bottom of each page. If you are not sure of an answer, feel free to guess. There is one and only one correct answer.

When you have finished all 30 items, turn back to this cover page and fill in the dotted space at the top of this page with the letter(s) then appearing on the blackboard.

PLEASE DO NOT TURN THE PAGE UNTIL THE SIGNAL IS GIVEN.

T

1. EVIL EATS AT THE HEART

1. E V A I R E T E A T T H L H E A S T
2. C V J S Y E T B H T T H L H A N O T
3. F V J S Y E T X I T T H O H O N O T
4. O V U J O I T X I T T H O H O I Q T

2. TO LEARN CONCENTRATE

1. S N K D Z Q M B N O D F O U S B U F
2. C L R O R A E N A T C E T O N E T N
3. T B M P J H L I D G R N F W T G C K
4. T B M D Z Q N C O G R N P V T B U F

3. FIRST EDUCATE OTHERS

1. O S N R S A E D V I W R P I U A Q R
2. O S N F A B H G C I W R S T D K E V
3. D E Q R S A C O B U S A I S G A Q R
4. D E S T T A E H R C O R I U S F E T

4. DISCOUNTS SAVE MONEY

1. L H N C B E N S R X I V D M N N O Y
2. F U X C A E N Z X X I V O M A N O Y
3. E S S C U D N A O S E V I M O N T Y
4. L H N C B E N J A F C V O M P M P Y

5. WASH AND SET YOUR HAIR

1. C T V N G U W F P S E A I D B J M K
2. Z D V K D Q G V H W B R X U K D L U
3. C T V K D Q F U G W B R I D B C K T
4. A T W H N S R A O R E I H A D Y S U

6. NOBODY ESCAPES DEATH

1. O O P E B D E A Y A E S D T S N C H
2. N N B B D Y Y S C C P P S D D D T H
3. A O R N E C B L H G F Y U S J D E T
4. A O R Z P E Y S C F B Q U S J D T H

7. A FACT SHAPES A FUTURE

1. U G U H A R R E O T F P G O V T G D
2. U G U D V T J U Q A T U G O V O S A
3. S L U H D A R E O P F J B C I T G D
4. T C S H A R F U A T F P E A U E S A

8. WITH FORCE THEY ENTER

1. W A O H F H G C F C H R Y Y N E C H
2. W E T H F N E C R I H T Y O E A T R
3. W E Z H F I Q C A Z H A Y A K Z A Q
4. W E Z H F N G C F S H D Y A K E C H

9. HOW PLEASANT TO DANCE

1. H B W P S P E S C A T T S E C A C I
2. H E W P O D O S N N T T L E A A C A
3. H O W P S P E S C L T T I F U A C I
4. H I W P J A U S U K T T I F U K C A

10. STARS SHINE BRIGHTLY

1. Y R R H E T S S I N I L G S T H A B
2. U V C T U U J K P C Z P G E F R J W
3. U C F N D S B E K A P D M I J T Y H
4. U V C U V V J K P A P D H F G T Y H

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A E I O U

(cont. on next page)

11. COIL AND TURN THE ROPE

1. F K E B D L A T M V P S H W C I O N
2. F K E I X K Z P Q U Q W H W C K L A
3. T E D A R H I C P R O O N E T L N U
4. Z L F I X K A Q R U Q W K H U R S H

12. KINGS GOVERN THE CITY

1. G H Y A E K B R O L M K V S T I N C
2. V G E C T H I I E G N R O K S Y N T
3. K N I R F F B R O M S Q E C E I N C
4. K N I I I I V O R E E E E C E T I I

13. HOLD A FESTIVAL THERE

1. L R C A D E S R D T A V B Y J D Q D
2. E L L V H R T S E I O F T H E A D A
3. O H A A D E F I I T A V E E E H E R
4. L R C V N E I H T S A O B Y J G F D

14. HELP ON CONSTRUCTION

1. H U J P E K C E K S T Q I C T A E K
2. H F O P S T C N M S T Q T C T A E K
3. H F O P S T C H N S T E B C T A L P
4. H E N P L O C N O S T N R C T I U O

15. PEOPLE CONFOUND LIFE

1. S O M Q M F E Q P J K A N D L H E D
2. S O M U L U D G H J K A B P F R P T
3. Q F P Q M F D P O E N T M C K H E D
4. O U E F I F N O N E O D E C P L L P

16. CONDEMN CCMPLAINING

1. A M L A B J K Z L M L N G O K G L E
2. C V F T S A B W H M L N G O K M C U
3. O N C N I I D L M N G C N O A P E N
4. A M L B C K L A M L N J Y G L G L E

17. CONCEAL YOUR FORTUNE

1. K Y J T B S M D G F L C A P E R I O
2. E Q P D H B M Z P F L C A P E W P G
3. R A C O O E U F Y N C T N R O Y L E
4. E Q P E G C N A Q W T H Q T V W P G

18. THE ANIMAL HURT A LIMB

1. S G D Z M H L Z K G T Q S Z K H L A
2. A A U E T A R I L L H N M H T B I M
3. S G D V L G O H J F S P S Z K D E S
4. L R C K M W O H J G D I N P V D E S

19. HE RIDES ON HORSEBACK

1. E D O H A D O N I E N O O D A Z A I
2. C K N H S O F G L T B E A D T S R J
3. E D O C F T O N I T B E A D T S F I
4. R O B O H H D I E K R E C S N S A E

20. BREATH ONLY FRESH AIR

1. C S F A T H H E O Y F R F T I C R M
2. T A O Y F A R L E R S I N E R H H B
3. C S F B U I P O M Z G S F T I B J S
4. R T H J I F K G E K L S N B C C R M

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A E I O U

(cont. on next page)

T

21. REMAIN ON FIRM GROUND

1. I F M Y B J N M F U Q M G Q N E K F
2. Q O M I U K A K F U Q M G Q A E K F
3. I F M Y B J G E F P K M G S N A R C
4. D E M I U A R N F N N M G I O R O R

22. REFUSE AN INVITATION

1. E J F I O A A N I N V T S I E U R N
2. Q U F I X U O N A N V A Z O Z A E N
3. H K F L P H N N C N V G N P L J D N
4. H K F V T F O N A N V J N P L A E N

23. FAILURE TALKS LOUDLY

1. L A Y R E L K I D A U O F U L T L S
2. A L L U R E T A L O O O O D D D L Y
3. L U C B P N S I E G F J H T R D P Y
4. L U C S V M T A L G F J H T R D L Y

24. THERE IS DANGER ABOUT

1. E H R I A R S D O N G T T E B U A E
2. S H D Q U A S C Z N G N Q O B L M K
3. N H G F H S S D C N G N O V B L M K
4. Z H U Q U A S F O N G U Q O B E I Z

25. BIRDS FLY ALONG THERE

1. B A R I S F L Y O E D N G E H L R T
2. B F R G S F V Y H O A N G L H B R C
3. B H R F S F K Y Z O A N G Z H B R C
4. B O R F S F J Y E J U N G Z H I R I

26. ONE CAN FORGET HATRED

1. U M I B E M D U Q F I S G E S Q I C
2. A F N S O G L T B V E C K Y S I J R
3. U M I E Q D D U Q V E C N F S I J R
4. O N O E T A A C R T E N E D H F G R

27. COME SING HERE WITH US

1. N W R C U H H E E O S T I G S M I E
2. A M K D R H L E F N H E Z L W F D U
3. O P B S K J K G V N H E R L C R D U
4. A M K C Q G L E F G T G Y K V I W U

28. HEAT MILK ON THE STOVE

1. H I E T M J O K H K T H F C T P V F
2. H L B T M A O K H G T H F C T R V N
3. H I E T M O J K U K T H I X T U V A
4. H E O T M L N K E A T H I E T O V S

29. LISTEN TO ART CRITICS

1. F G L T B V E G Y N C K H A S T I C
2. F G L U F O P U S N C K U J U U T D
3. N I C O I E T C S L R T I A T T S R
4. O J U U F O U P B U U E U J U J E U

30. IN THE FUTURE THROW IT

1. N N T H F F T T R R T T H R W W T T
2. R D V C A O F G B M N L Y K E H U I
3. H O T N R U T E U I W R E T H I T F
4. N N T S Q S Q Y S M N L Y K E W T T

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A E I O U

Now turn back to the <u>cover page</u> and in the dotted space at the top put the <u>letter(s)</u> now appearing on the board.

Appendix B

False Starts and Revisions

The experiment started with a rearrangement general code as the General Code III. It turned out, however, with the college level students under the present power set-up to be so easy that almost everyone got a perfect score. The present Code X or General Code III was devised after long search for a more suitable testing code.

The original 40 item T Test had to be given up because it was too long for the academic hour of 50 minutes. However, the 10 sentences which were the same as those in Test 1 were found to give no better scores than the new sentences on the same codes as in Test 1. This made feasible a single Test T made of 30 new sentences, 10 for each of the 3 general codes using all 30 of the specific codes. It made it possible to give up having a separate T Test for each of the general codes. Now all Ss get the same Test 2.

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TITLE

Relationship between the Way General and Specific Principles Are Learned and How They Are Used

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ABSTRACT

Are coding principles derived by an S relatively more available for transfer and application than those given an S? Past experiments differed.

For various groups of 1100 college students the independent variable was the differing amounts of general or specific guidance beyond a coded example for each of ten sentences, all coded differently but in the same family of codes. The dependent variable, given immediately, a week, or six weeks later, was performance on thirty mc encoding problems, ten based on the same codes as in the initial test and twenty on the codes in the other two families. Ss either derived or were guided except for an interaction group in which Ss had both situations in the first test.

For coding problems given as a power test, with each different but redundant for a general principle, and importantly, with no intimation during the learning of a further transfer test, certain conclusions appear warranted. While the "derived-given" experimental variable was differentiable from controls in the mc transfer test, deriving and guided groups exhibited no consistent differences between themselves.

A reexamination of the earlier articles on guidance corroborates that some transfer is possible with either a deriving or guided situation. More fundamental factors such as projection-anticipation may be determining transfer when it occurs.